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A NEW FRANKLINIELLA (THYSANOPTERA) FROM FLORIDA

By J. R. WATSON AND J. R. PREER[1]

***Frankliniella pontederiae* n. sp.**

FEMALE (macropterous):—Length about 1.03 mm. (distended about 1.4 mm.). Color chestnut brown by reflected light, raw sienna by transmitted light (Ridgway), almost uniform brown, thorax and anterior abdominal segments with weak orange-yellow, hypodermal pigment; legs and antennae lighter than body; tarsi almost colorless, occasionally clouded with brown and a dark spot at the base of the apical segment. Wings, including setae, practically colorless, body setae light brown; antennal segment II brown, nearly as dark as the head; IV to VIII mouse gray, III somewhat lighter, I darker.

Head about 0.63 as long as greatest width, broadest across the eyes, slightly narrowed posteriorly, cheeks slightly arched; inter-ocellar setae long (about 56 microns), situated between the posterior ocelli; postocular setae weak (about 16 microns long); other dorsal cephalic setae minute.

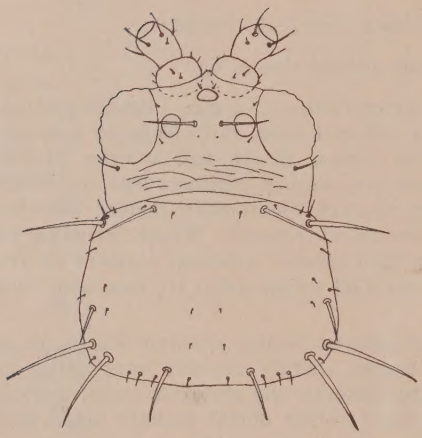
Eyes about 62 microns long, 42 wide, their interval about twice their width, occupying somewhat over half the total length of the head. Ocelli large, oval in outline (16 microns wide and 21 long), posterior pair situated somewhat behind the middle of the eyes and close to their margins, bordered by narrow dark red crescents. Their interval a little over twice their width. Antennae short and stout, about 2.6 times the length of the short head; intermediate segments being especially short, segment II not produced dorsally and without especially strong spines; segment III with apical portion of pedicel slightly swollen; segment V short and broad, narrowed very little distally, broadly joined to VI and only about 1.5 times as long as broad; style almost as long as segment VI. Setae rather weak, brown, paler and weaker apically. Mouth cone extending to posterior border of prosternum.

Prothorax about 1.4 times as wide as long; major setae long, measuring as follows in microns: antero-marginal 69, antero-angular 80, pair at posterior angles 93, large sub-median pair on posterior margin 53; other setae normal except the pair just posterior to the middle of lateral margins which are much stronger (about 50 microns).

[1]Contribution from the Department of Entomology, Florida Agricultural Experiment Station.

Fore wing with 23-27 setae on anterior margin, anterior vein with usually a group of three followed by 13-14 fairly evenly spaced setae, posterior vein with 10-12, all nearly colorless.

Abdomen of normal form and structure: tergum VIII with comb sparse and weak, but complete; setae on segment X brown, long and strong; tergum X divided for nearly three-fourths of its length.



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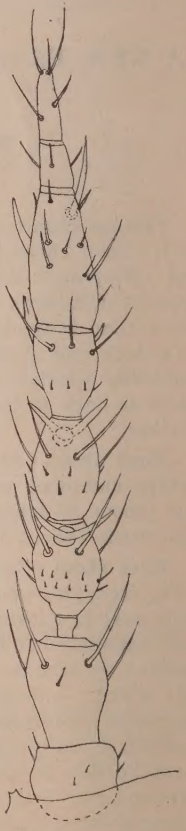

b.

Fig. 1.—(a) Head and prothorax of *Frankliniella pontederiae* n. sp. ♀ paratype. (b) Right antenna.

Measurements of female (mostly holotype) in mm.: Head, length .105, width .17; prothorax, length .15, greatest width (including coxae) .23; mesothorax, greatest width .31; metathorax, greatest width .30; forewings, length .82, width at middle .08; abdomen, greatest width .31; antennal segments, length (width) in microns:—I, 34(37); II, 40(29); III, 48(24); IV, 39(24); V, 32(21); VI, 44(24); VII, 16(11); VIII, 24(6); total .27 mm.

MALE, length about .87 mm. (distended about 1.14):—Much smaller than the female and lighter in color, brownish yellow. Wings short, extending but little beyond the tip of the short abdomen, membrane often shaded very light brown, fore vein with 14-16 setae, hind vein with 9-12, abdominal sternites 3-7 each with a large oval semitransparent area.

Measurements of male (mostly allotype) in mm.: Head, length .08, width .15; prothorax, length .13, greatest width .21; mesothorax, greatest width .26; metathorax, greatest width .26; forewings, length .63, width at middle .07; abdomen, greatest width .19; antennal segments, length (width) in microns: I, 30(35); II, 37(27); III, 40(21); IV, 35(24); V, 27(19); VI, 37(22); VII, 13(10); VIII, 21(5); total .24 mm.

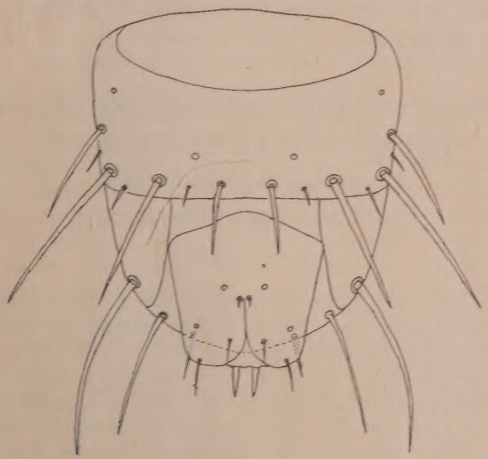

Fig. 2.—9th and 10th abdominal segments of *Frankliniella pontederiae* n. sp. ♂ paratype.

Nymphs a deep yellow color.

In general appearance, color and small post-ocular setae, this species suggests *fusca*, but can be at once distinguished by the form and color of the antennae and the wings and tarsi.

The strong seta on the lateral margin suggests *Scolothrips* but is much shorter and stouter than in that genus and situated more posteriorly. It is in the same position but stouter than the corresponding one in *F. fusca*.

Described from 14 macropterous females and 14 males. Collected by the junior author on July 28, 1937, near Melbourne, Florida, and near Fort Drum on August 12, 1937, from spikes of *Pontederia cordata*, and by the senior author from the same host in Manatee County, on October 5, 1937.

Types in the collections of the authors.

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THE GROSS ANATOMY OF THE DIGESTIVE AND REPRODUCTIVE SYSTEMS OF *Naupactus leucoloma* Boh. (Curculionidae, Coleoptera)[1]

A. N. TISSOT

On July 7, 1937 and again on July 20 the writer together with Professor J. R. Watson and other entomologists visited the region of western Florida and southern Alabama infested with the White-Fringed Beetle, *Naupactus leucoloma* Boh. On both occasions the weevils were found in considerable numbers on cotton and peanuts and to a lesser extent on some other plants. A question arose concerning the sexes of the beetles and whether or not there were any external characteristics that would enable one to distinguish between them. All the specimens examined in the field appeared to be alike and a large number of them were collected for further study. After returning to Gainesville a few dozen specimens were dissected and in every case were found to be females. Since then about 200 beetles have been dissected and no males have been found. Parthenogenetic reproduction is rather common in the subfamily Otiorhynchinae to which this weevil belongs. Ssilantjew (7)[2] appears to have been the first to note and report upon the occurrence of parthenogenesis in this insect group. Palm (4) reports this method of reproduction in the Alfalfa Snout Beetle, *Brachyrhinus ligustici* L. Smith (5) cites numerous references and mentions several species of weevils that are known to breed parthenogenetically.

The first few dissections revealed some interesting features of the internal anatomy of this beetle. There appeared to be no publications dealing with its anatomy and the writer decided to study the digestive and reproductive systems with the thought of preparing a paper for publication. Bissell (1) and Snodgrass (6) have been followed rather closely for the names of the parts of these two systems.

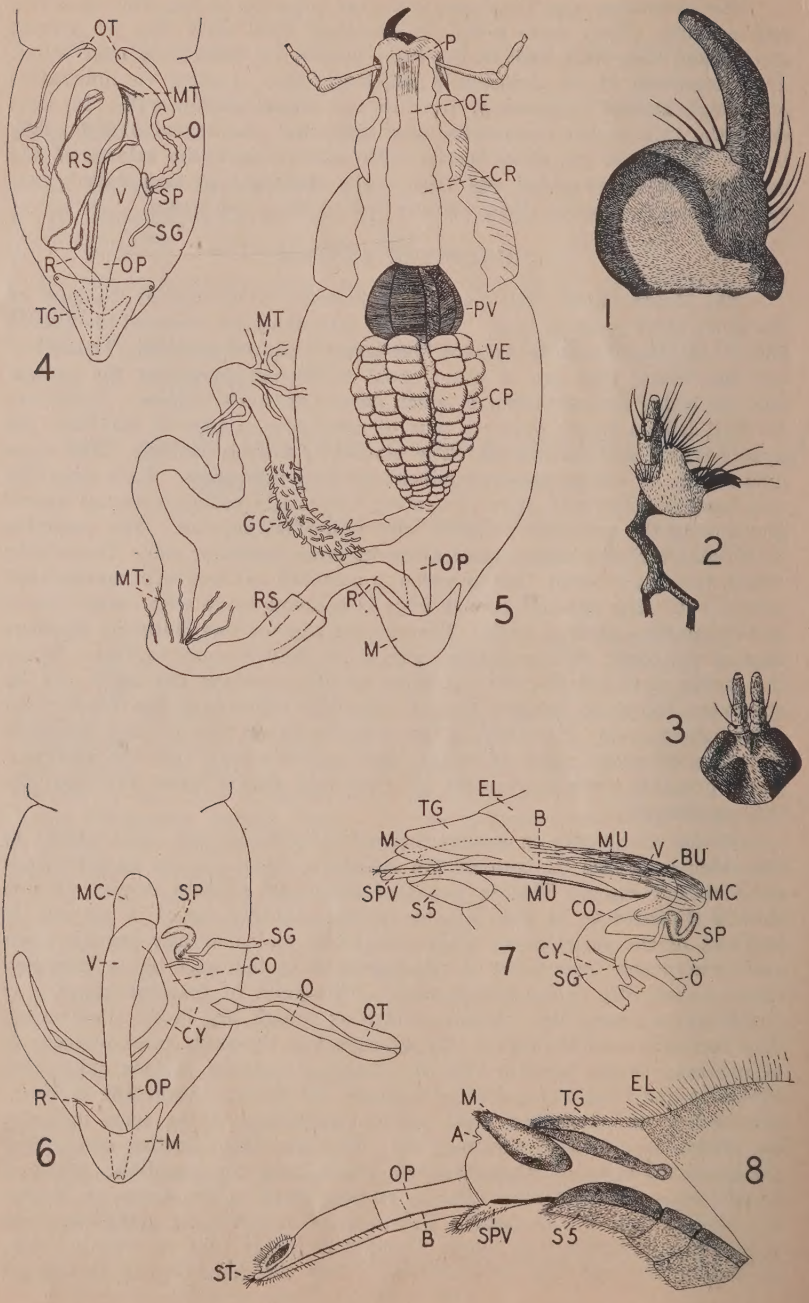
[1]Contribution from the Department of Entomology, Florida Agricultural Experiment Station, Gainesville, Florida.
[2]Numbers in parentheses refer to Literature Cited.

The specimens used for dissection were collected in the field on cotton and peanuts. They were killed by dropping them alive into 70 percent alcohol and they were kept in the same alcohol in which they were killed. The integument of the abdomen is sufficiently thin to allow the infiltration of enough alcohol to preserve the internal organs fairly well. In some cases the thin-walled ventriculus was somewhat disintegrated and easily broken up and in the older beetles with mature eggs, the calyces of the ovaries were so distended and their walls stretched so thin that it was very difficult to remove them without having them fall apart.

DIGESTIVE SYSTEM

The Mouth Parts: The mouth of this beetle is situated at the apex of the short, thick snout or beak. When the mandibles are removed the opened end of the beak is seen to present four large V-shaped notches. The dorsal and the lateral ones are of about equal width and depth but the ventral one, the gular emargination, is much deeper than the others. There are six well-defined mouth parts; a pair of mandibles, a pair of maxillae, the hypopharynx, and the labium. The labrum is entirely lacking. The mandibles (Fig. 1) are the most prominent of the mouth parts. Each mandible is a heavily sclerotized piece presenting a strongly convex external aspect and having the posterior or inner face somewhat concave. The mandible articulates with the head capsule along its lower posterior side. Posteriorly within there is a broad face to which is attached the powerful muscle that operates it. The anterior cutting edge is a broad curve with rather acute, smooth margin without teeth. The cutting edge of one mandible overlaps that of the other, fitting closely against its convex outer surface. When the mouth is closed the left mandible usually overlaps the right. In 50 specimens chosen at random the left mandible overlapped the other in all except three cases. Attached to the posterior inner face of each mandible is a thin chitinous plate or curtain that extends back into the pharynx. These probably serve to keep the pharynx open and to direct the food into the oesophagus.

Rather frequently in newly emerged individuals, and more rarely in the older ones, one or both of the mandibles bears on its anterior face an accessory piece. This is a rather long and slightly curved process that is supposed to be used by the freshly matured insect in cutting its way out of the pupal case. These accessory pieces usually are lost soon after emergence, their point of attachment being indicated by an irregular scar on a slightly raised protuberance. The point of fracture appears as a slightly impressed line which is shown as a dark line in the illustration. This form of mandible with a cutting edge and accessory piece appears to be contrary to the general rule for insects belonging to this subfamily. Blatchley and Leng (2) referring to Horn (3) write: "According to Horn, the form of the mandible itself, without reference to the scar, indicates the occurrence of the deciduous piece. In those snout beetles, comprising the great majority of Rhynchophora, which have the mandibles acute at tip and one overlapping the other by an edge more or less acute, no deciduous piece or scar will be found. But in those in which the mandibles meet with a broad surface, and whose function is rather that of crushing than of cutting, the scar may be expected." That the mandibles in this insect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indeed function as cutting organs rather than crushing is indicated by the food in the alimentary tract. An examination of this food discloses many relatively large pieces with rather sharp-cut and angular margins that show no evidence of crushing.

With the exception of the basal portion of the labium the rest of the mouth parts lie within the concavity of the mandibles when these are closed. The maxillae (Fig. 2) are rather fleshy and slightly sclerotized organs. The most prominent features of the maxilla are the four-jointed palpus and the large lacinia bearing four large chitinous teeth on its posterior margin. The labium (Fig. 3) is reduced to three parts; the three-jointed palpi being attached directly to the apex of the mentum which, with the submentum, forms a roughly hexagonal plate. All vestige of the suture between the mentum and the submentum has been lost and the ligula is wholly wanting. The rather pointed anterior end of the hypopharynx lies between the maxillae. It broadens posteriorly forming floor of the buccal cavity. The hypopharynx is a soft and yielding organ, its surface presenting a slightly roughened appearance.

THE ALIMENTARY TRACT

The digestive tract (Fig. 5) is approximately twice the length of the body and varies greatly in diameter in its different portions. The anterior half is relatively straight but the posterior half lies in coils and loops. It is attached to the body wall at each end but for the rest of its length lies free in the body cavity, being supported more or less by tracheae and fatty tissue. Dorsally, the meso- and metathorax are very short, the abdomen extending far forward toward the posterior margin of the prothorax. The dorsal abdominal wall is membranous and it is practically impossible to determine the limits of the segments. When the elytra are removed loops of the hind intestine and parts of the reproductive system frequently are visible through the abdominal wall. In other cases these organs are embedded in a mass of fatty tissue that hides them from view.

EXPLANATION OF FIGURES

Fig. 1.—Lateral view of left mandible with accessory piece intact. Cutting edge to the left, X 26.
Fig. 2.—Mediad view of left maxilla, X 26.
Fig. 3.—Ventral view of labium, X 26.
Fig. 4.—Dorsal view of abdomen showing general arrangement of organs visible when dorsal wall is removed, X 6.
Fig. 5.—Dorsal view with digestive system extended to show the different parts, X 8.5.
Fig. 6.—Dorsal view of abdomen showing reproductive system, somewhat diagrammatic, X 8.5.
Fig. 7.—Lateral view of posterior part of body showing part of reproductive system, ovipositor retracted, X 12.
Fig. 8.—Lateral view of posterior part of body showing ovipositor extended, X 12.

ABBREVIATIONS

A, anus; B, baculum; BU, bursa copulatrix; CO, common oviduct; CP, caecal pouches; CR, crop; CY, calyx; EL, tip of elytron; GC, gastric caeca; M, mantle; MC, muscle cap; MT, malpighian tubules; MU, muscle bands; O, oviduct; OE, oesophagus; OP, ovipositor; OT, ovarian tube; P, pharynx; PV, proventriculus; R, rectum; RS, rectal sac; SG, spermathecal gland; SP, spermatheca; SPV, spiculum ventrale; ST, stylus; S5, fifth sternum; TG, last abdominal tergum; V, vagina; VE, ventriculus.

The fore-intestine: This part of the digestive tract is a relatively straight tube that widens posteriorly. Immediately behind the buccal cavity the short pharynx (P) narrows posteriorly to the oesophagus. The walls of the pharynx are light brown, slightly sclerotized with a roughened surface. The oesophagus (OE) is a short thin walled transparent passage that lies beneath the brain. Immediately behind the brain at about the hind margin of the eyes the oesophagus joins the crop that suddenly dilates to form a large storage chamber. The crop (CR) extends back through the head and reaches nearly to the posterior edge of the prothorax. Except for its tapering anterior end the crop is of rather uniform width. It usually is filled with food and shows no foldings of its walls. The crop opens into the nearly spherical gizzard or proventriculus (PV) that occupies the region of the meso- and metathorax. Externally the gizzard is covered with a layer of circular muscles. The muscle fibers are not continuous around the circumference of the organ but are divided into eight sections. The end of each section is attached to the edge of a longitudinal chitinous plate that bears on its inner edge a comb-like structure composed of a great many bristle-like chitinous teeth. These teeth all are inclined posteriorly, those at the anterior end of the plates being longer than the rest. The plates are arranged in eight pairs corresponding to the eight sections of the circular muscles. The gizzard is attached to the ventriculus or stomach posteriorly. Between these two parts of the tract is the cardiac or stomodaeal valve. This is essentially a muscular fold or ring attached to the posterior end of the gizzard and projecting into the ventriculus.

The mid-intestine: The stomach or ventriculus (VE) is the widest part of the alimentary tract. Its anterior portion is a large pear-shaped structure that occupies the anterior part of the abdominal region and rests directly on the ventral wall. The ventriculus is a thin walled organ whose surface consists of numerous protruding caecal pouches (CP) with deep constrictions between them. Within these constrictions lie many loops of the malpighian tubules. Postero-ventrally the ventriculus is attached to the much narrower second portion of the mid-intestine. This lies in a rather tight close spiral on the floor of the abdomen. This narrowed portion of the intestine exhibits three distinct regions of approximately equal length. The first is smooth except for a slight wrinkling due to its tightly coiled position. The middle portion bears numerous finger-like gastric caeca (GC) and the third portion is smooth-walled. The posterior end of the mid-intestine is indicated by the point of attachment of the malpighian tubules.

The hind-intestine: This portion of the tract is divided into three well-defined regions. A short distance behind the point of origin of the malpighian tubules is a very abrupt constriction, the pyloric valve. Following this is a region of rather uniform width. Its walls are thin and transparent, the food material within being clearly visible. The anterior part of this region forms a close S-curve that lies against the posterior wall of the ventriculus. Following this curved section is a straight portion that extends antero-dorsally to the front of the abdomen. At this point the tube bends sharply back on itself and here the malpighian tubules re-enter the intestine wall. The next portion is termed the rectal sac (RS) by Snodgrass. It extends posteriorly and lies close to the dorsal wall,

usually being visible when the elytra are removed. It broadens posteriorly then is abruptly constricted. This constriction marks the beginning of the rectum. The rectal sac is covered with a thick layer of longitudinal muscle and when it is not distended with food its walls show some longitudinal folds. The rectum (R) is of nearly uniform width being much narrower than the rectal sac. The rectum opens posteriorly at the anus (Fig. 8A). The anal opening is situated above the ovipositor and beneath a shield-shaped plate that Bissell (1) terms the mantle (M). This may represent the last abdominal tergum though the one labelled (TG Figs. 7 and 8) is the last one bearing a spiracle.

The malpighian tubules: The six malpighian tubules (MT) of this beetle are extremely long and slender and they lie in numerous loops and convolutions. At their point of origin they are always attached in a definite pattern. Four of the tubes arise in a group on one side of the intestine and the other two arise together on the opposite side. Due to their very delicate structure and their manner of twisting around and between the alimentary tract and the reproductive organs it is extremely difficult to dissect out a complete and unbroken tubule. In the few instances where this was accomplished the tubules were found to be much longer than the entire alimentary tract. At their origin the tubules are attached to the intestine wall at an acute angle anteriorly. Two of the tubules lie for most of their length in loops and convolutions between the rectal sac and the vagina. The other four meander about, reaching all parts of the abdomen. For much of their length they twist about the ventriculus, lying in the constrictions between the caecal pouches. All the tubules finally reach the same point and reenter the intestinal wall at a short distance before the beginning of the rectal sac. The proximal portion of the tubules is wider and apparently thicker walled than the distal portion.

The salivary glands: Each salivary gland is a long, delicate, thread-like tube that loops about in the side of the head, lying above the powerful mandibular muscles. The opening into the mouth cavity is at a point near the base of the maxilla.

REPRODUCTIVE SYSTEM

Males of this insect have not been found and apparently it is able to maintain itself by parthenogenetic reproduction. However, certain features of the reproductive system, particularly the presence of a spermatheca and copulatory pouch indicate that males may occur at times.

In the young newly emerged females the reproductive system consists of rather slender tubes that lie in numerous loops in the abdomen. In the older beetles that are ready to begin laying eggs, portions of the tubes are very much distended and tightly packed with relatively large oval eggs. In this condition the tubes are considerably distorted and occupy a considerable portion of the abdominal space.

The ovaries: In the anterior portion of the abdomen just beneath the dorsal wall there lie two pairs of tubes that Snodgrass (6) terms the ovarioles and that Bissell (1) terms the ovarian tubes (OT). The two tubes of each side constitute an ovary. At their anterior extremities the two ovarioles of each pair are joined together by a short slender filament. Though the apices of the two pairs of ovarioles sometimes lie close together

along the median line of the body there is no connective between them and neither is there any connection to the body wall. The ovarioles lie embedded in a mass of fatty tissue that supports them. Each ovariole is enclosed in a thin membranous envelope. The ovarioles extend diagonally toward the sides of the abdomen and constrict rather sharply into the oviducts. In the younger beetles the oviducts (O) are slender tubes that lie in close irregular loops at the sides of the abdomen and lead downward toward the ventral wall. The oviducts of each side unite to form a single tube termed the calyx (CY). The two calyces unite to form the common oviduct (CO). In the older beetles the upper parts of the oviducts show rather regular expansions and constrictions indicating the presence of the developing eggs. In the lower parts of the oviducts there are larger, more nearly mature eggs and in the calyces are fully developed eggs. The walls of the calyces are very greatly distended and distorted and have lost all resemblance to their former condition. The junction of the two calyces lies close to the ventral abdominal wall and from this point the common oviduct leads dorsally and anteriorly and then curves sharply backward to enter the genital chamber or vagina.

The genital chamber and the ovipositor: Slightly to the right of the median line of the posterior portion of the abdomen lies the vagina (V) and its extension the ovipositor (OP). These structures lie close to the dorsal wall and often are visible when the elytra are removed though in some cases they are concealed by fatty tissue. The vagina is a short pouch-like structure that receives the common oviduct at its anterior end. It tapers into the ovipositor posteriorly. Extending forward from the dorsal anterior end of the vagina is a flattened thin-walled chitinous pouch, the copulatory pouch or bursa copulatrix (BU). The walls of the vagina are chitinous and have a great many longitudinal folds that allow for expansion and the passage of the eggs. The vagina and the brusa are completely covered with a thick muscular layer. Surrounding the anterior end of the vagina is a large mass of muscle tissue that for want of a better name may be termed the muscle cap (MC). This simply fits around the end of the vagina and is not very firmly attached to it, the two being separated very easily. The ovipositor is a long thin-walled tube that is continuous with the body wall. It is capable of being extended far beyond the end of the body and telescopes into itself and may be retracted completely within the abdomen. Beneath the ovipositor in its retracted position is a heavy, slightly curved, chitinous rod the spiculum ventrale (SPV). The anterior end of the spiculum is embedded in the muscle cap and its posterior end widens into a spoon-shaped structure. Surrounding the ovipositor are heavy longitudinal muscles. Anteriorly these muscles attach to the muscle cap and posteriorly to the body wall. The contraction of these longitudinal muscles draws the vagina and oviduct backward and straightens the curve of the common oviduct. The spiculum ventrale lends stiffness to the ovipositor and forces it out of the body. The apical part of the ovipositor is supported and strengthened by two longitudinal ribs or baculi (B). Each baculum bears on its posterior half a row of short spines that are inclined slightly forward. On each side near the apex of the ovipositor is a somewhat oval chitinous plate bearing a number of fine

short spines. At the very tip of the ovipositor is a pair of short thick styli (ST). Each stylus bears four or five short spines at its apex.

The spermatheca: Often when the dorsal abdominal wall is removed a small dark brown object is visible to the right of the middle. This is the spermatheca (SP) or receptaculum seminis. The spermatheca is a sickle-shaped structure with the handle end of the blade much broadened. Its walls are somewhat heavily sclerotized and though thin are fairly rigid. Two ducts enter the spermatheca at the thickened end in the position corresponding to the handle of a sickle. The duct nearest the end leads to the vagina. It does not enter directly into the vagina but enters the wall of the common oviduct at about its middle and runs along in the oviduct wall to its point of entry into the vagina. This spermathecal duct is a thin-walled chitinous tube that has a rather heavy covering of muscle or connective tissue. The other duct entering the spermatheca is the spermathecal gland (SG). This gland consists of a narrow chitinous tube lying in an outer envelope of thick-walled tissue. The cavity of the spermatheca is filled completely with a mass of white material, probably the product of the spermathecal gland. When observed under the high power of the microscope this material presents a somewhat granular appearance.

LITERATURE CITED

(1) BISSELL, THEO. L. 1937. Structure of the Reproductive System of the Pecan Weevil (Curculionidae). Ann. Ent. Soc. Amer., 30: 242-251, 2 plates.

(2) BLATCHLEY, W. S. and LENG, C. W. 1916. Rhynchophora or Weevils of North Eastern America.

(3) LECONTE, JOHN L. and HORN, GEORGE H. 1876. The Rhynchophora of America North of Mexico.

(4) PALM, CHARLES E. 1935. The Alfalfa Snout Beetle, *Brachyrhinus ligustici* L. Cornell Agr. Exp. Sta., Bul. 629, p. 9.

(5) SMITH, FLOYD F. 1932. Biology and Control of the Black Vine Weevil. U.S.D.A., Tech. Ser. Bul. 325, pp. 20-21.

(6) SNODGRASS, R. E. 1935. Principles of Insect Morphology.

(7) SSILANTJEW, A. A. 1905. Uber Einen Sicher Konstatierten Fall der Parthenogenese bei Einen Kafer *(Otiorhynchus turca* Bohem.). Zool. Anz., 29: 583-586.

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NOTES ON PAMERA POPULATIONS ON VARIOUS TYPES OF PLANT COMMUNITIES IN THE VICINITY OF PLANT CITY

By J. W. WILSON

Three species of pamera, *Orthaea longulus* (Dallas), *O. vincta* (Say) and *O. bilobata* (Say), are found on strawberry plants and other vegetation which forms a heavy growth near the ground in the strawberry growing section near Plant City. Of the three species *O. bilobata* is by far the most abundant. Determinations were made by Miss K. V. Wheeler by comparing identified specimens in the department collection at Gainesville.

A study of the pameras was begun to determine host plants, where and how they pass through the summer and if possible why the pameras occasionally become abundant enough to cause considerable damage. In previous years various workers have observed that heavy pamera infestations are correlated with hot, dry winters. For example, the heaviest infestation observed in the Plant City section occurred during 1931. Table 1 gives the temperature and rainfall for the winter months of 1931-32 with the ten year average temperature and rainfall for these months as recorded at the Strawberry Laboratory, Plant City.

TABLE 1.

Month	Temperature, F.			Rainfall, Inches		
	1931-32	1937-38	10 yr. Ave.	1931-32	1937-38	10 yr. Ave.
November	70.3	64.0	66.7	.03	3.56	1.31
December	72.3	59.8	62.1	1.26	1.10	1.88
January	67.4	59.3	63.1	.93	1.49	2.18
February	70.6	65.8	64.5	.22	.72	2.45
March	62.8	71.4	65.4	3.87	1.96	3.95

It readily can be seen from this table that the temperature for all of the months of 1931-32 except March were higher than the average and the rainfall except for March was lower. Moreover, during the winter months of 1937-38 the temperatures were average or below for all months except March, while the rainfall for November was high, and below average the remaining months. The infestation of pameras began building up during February and March as is indicated in Table 2.

In Table 2 the various types of vegetation from which samples were taken are given. During November, December and January when the strawberry plants were small with few dead lower leaves, no pameras were observed on the strawberry plants with one exception. Two fields in which straw had been placed to protect the plants from frost were examined as well as a number of fields in which straw had not been used. At the beginning it was planned to watch these two fields closely to see if pameras appeared in them before they did in fields where straw was not used. Due to interference of other work these observations could not be continued after January 4th. The exception mentioned above was a field about 14

miles northwest of the laboratory in which, on December 30th a small number of pameras were observed. The plants in this field were about eight inches across while most of those in other fields were about four inches across. No further observations were made in this field also due to the interference mentioned above.

TABLE 2.—Counts of pamera population (nymphs and adults) on various types of vegetation. Previous to January 14th the counts were made by the author. Twenty sweeps of the net were taken as a unit, in some cases more than one unit count was made on the same vegetation. In these cases each unit is shown under the numbers (example, green bermuda, under some dates 3 unit counts were made and recorded as count 1, 2, and 3.) The count of January 14th and subsequent counts were made by the laboratory technician who merely swept over approximately the same territory each time.

Date	Syntherisma sp. Dead	Bermuda and Syntherisma Dead	Dead and Dry Natal Grass	Green Bermuda	Smut Grass	Strawberry Plants	Mixture Ditch Bank	Mixture Ditch Bank by Technician
		1 2		1 2 3	1 2		1 2 3 4 5	
12/3/37	6	5	2	0 0 0	2 6	0		
12/8/37	10	3 9	2	0 1 1	0	0		
12/15/37	4	0		3		0	1 1 0 2 1	
12/22/37	3	2	0	0 0	0		0 0 1 0 1	
12/29/37	0	2	0	0 0			0 1 1 1 0	
1/4/38	0	0 0		0 0 0			0 0 0 0 0	
1/14/38						0		2
1/17						0		0
1/19						0		6
1/22						0		0
1/24						0		4
1/27						0		0
1/31						0		0
2/2						20		3
2/4						10		13
2/8						30		0
2/9						17		3
2/10						38		0
2/14						32		0
2/16						10		0
2/18						0		0
2/22						8		0
2/25						3		0
2/28						1		0
3/1						4		3
3/23						50		
3/24						78		

In addition to the low temperatures experienced during November, December and January 1937-38 environmental conditions in the strawberry fields were poor for a heavy infestation of pameras. August, September and October were very dry months which delayed the transplanting of the strawberry plants from the nursery to the field. As a result the plants grew poorly. The early cold periods in November further retarded the growth of the plants to the extent that plants were generally far below the normal size.

It appears from observations made during the recent months that pameras may be found on almost any low growing vegetation that covers the ground well; and that they pass the months when there are no strawberry plants on such vegetation. Migration to the strawberry plants takes place when the plants attain sufficient size to furnish the proper environmental conditions and heavy infestations of the pameras are directly influenced by the temperature and rainfall.

During the first part of November adult and nymphal pameras with a few specimens of adult *Geocoris punctipes* (Say) were placed in a lantern globe cage over a strawberry plant. From an adult *G. punctipes* a parasitic fungus which also attacks pameras was isolated. Dr. A. N. Brooks made cultures of this fungus some of which were sent to Mr. Erdman West, Mycologist of the Florida Agricultural Experiment Station, and to Miss Vera K. Charles of the U. S. Department of Agriculture. Mr. West placed the fungus in the genus *Beauveria* and Miss Charles identified it as being *B. bassiana* (Bals.) Vuill.

Here again cool moist conditions are favorable to the development of this fungus and the fungus may play an important part in preventing the development of an abundant population of the pameras when these conditions prevail.

SERICOTHRIPS LANGEI MOULT. IN FLORIDA

By J. R. PREER

On April 16, 1938, at Lake Bryant, Marion County, Florida, a series of thrips was taken from the leaves of *Nymphaea* by the author. Of the fifteen all but one proved to be *Sericothrips langei* Moult., the other being *S. langei tissoti* Wats. The species was described by Moulton in 1929 from three females taken at a lake in Illinois. Watson described the variety from Alachua County, Florida (FLORIDA ENTOMOLOGIST, Vol. XX, No. 1, pp. 2-3, 1937). The above collection thus extends the range of the species to Florida and also bears out the conclusions of Watson and Moulton that the form described by Watson should be given varietal instead of specific rank and verifies the conclusion drawn as to the host plant. The variety is distinguished from the species by the complete absence of the dark, distal, transverse band on the fore-wings of the female and its reduction in the male. The description of the male of *S. langei* Moult. will be published at a later date.

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